

11.3
 (7)

$$\left(\frac{1}{8}\right)^{2x} \downarrow (2^{-3})^{2x} = 2^{-6x}$$

(24)

$$\frac{450}{2300} = \frac{2300}{2300} (1 + 0.06)^x$$

$$1.8 = 1.06^x$$

$$x = \frac{\log 1.8}{\log 1.06} \approx 10.13 \text{ yrs.} \boxed{= 11 \text{ yrs}}$$

1.6

$$\#11 \quad y = 3 \csc(3x + \pi) - 2$$

$$y = a \csc[b(x - c)] + d$$

$$y = 3 \csc\left[3\left(x + \frac{\pi}{3}\right)\right] - 2$$

$$y = 3 \sin\left[3\left(x + \frac{\pi}{3}\right)\right] - 2$$

$$\text{Start} = -\frac{\pi}{3}$$

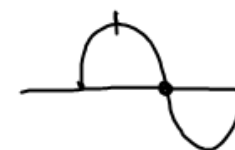
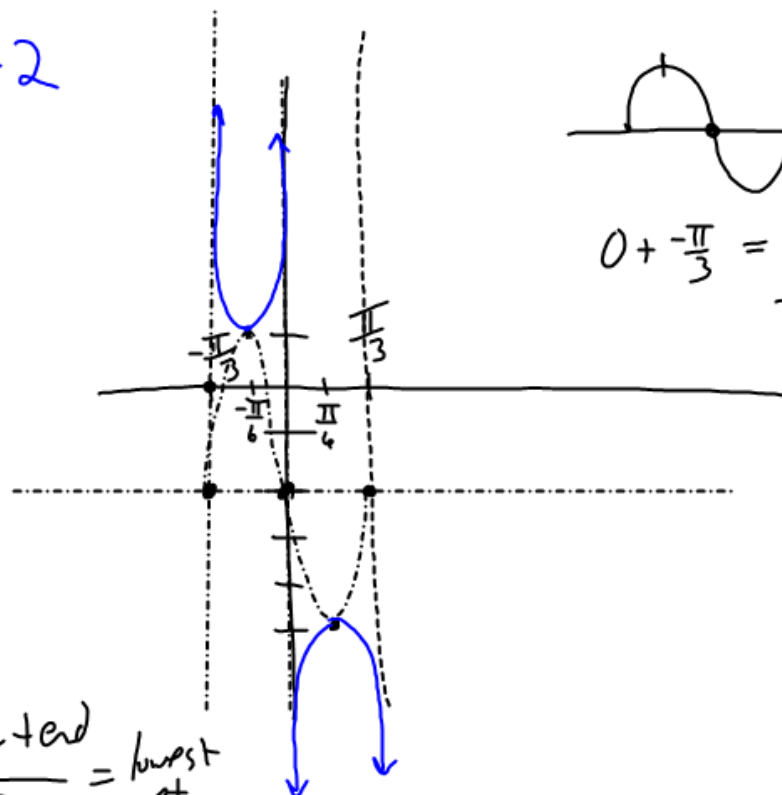
$$\text{Per} = \frac{2\pi}{b} = \frac{2\pi}{3}$$

$$\text{end} = \frac{\pi}{3}$$

$$\frac{\text{start} + \text{end}}{2} = \frac{-\frac{\pi}{3} + \frac{\pi}{3}}{2} = 0 = \text{middle}$$

$$\frac{\text{start} + \text{mid}}{2} = \text{highest pt.}$$

$$\frac{\text{middle} + \text{end}}{2} = \text{lowest pt.}$$



$$0 + \frac{-\pi}{3} = \frac{-\pi}{3} \cdot \frac{1}{2} = \frac{-\pi}{6}$$

1.6

24

$$a = \frac{(\text{highest } y\text{-value} - \text{lowest } y\text{-value})}{2}$$

$$b = \frac{2\pi}{\text{per.}} \rightarrow \text{use context}$$

c = x -value of highest value
if you use cosine

$$d = \frac{(\text{highest } y\text{-value} + \text{lowest } y\text{-value})}{2}$$

$$y = 25 \cos \left[\frac{\pi}{6} (x - 8) \right] + 55$$

$$y = 25 \sin \left[\frac{\pi}{6} (x - 5) \right] + 55$$

1.5

#20

$$y = x^2 + 2x + 1$$

$$y = (x+1)^2$$

$$x = (y+1)^2$$

$$\sqrt{x} = y+1$$

$$\sqrt{x} - 1 = y$$

$$(35) \quad e^x + e^{-x} = 3$$

$$e^x \cdot e^x + \frac{1}{e^x} \cdot e^x = 3 \cdot e^x$$

$$(e^x)^2 + 1 = 3e^x$$

$$(e^x)^2 - 3e^x + 1 = 0$$

$$x^2 - 3x + 1 = 0$$

$$x = \frac{3 \pm \sqrt{(3)^2 - 4 \cdot 1 \cdot 1}}{2 \cdot 1}$$

$$e^x = \frac{3 \pm \sqrt{5}}{2}$$

$$x = \ln \left(\frac{3 \pm \sqrt{5}}{2} \right)$$

(46) $\frac{1}{2}$ -life

start $\left(\frac{1}{2}\right)^{\frac{x}{\text{time per.}}}$

$$y = ab^x$$

$$y = 8\left(\frac{1}{2}\right)^{\frac{x}{12}}$$

$$\frac{1}{8} = 8\left(\frac{1}{2}\right)^{\frac{x}{12}}$$

$$\frac{1}{8} = \left(\frac{1}{2}\right)^{\frac{x}{12}} \rightarrow \frac{x}{12} = \frac{\log\left(\frac{1}{8}\right)}{\log\left(\frac{1}{2}\right)}$$

$$\frac{x}{12} = 3$$

$$\boxed{x = 36}$$

$$(38) \ln(y-1) - \ln(2) = x + \ln(x)$$

$$\ln\left(\frac{y-1}{2}\right) = x + \ln(x)$$

$$\ln\left(\frac{y-1}{2}\right) - \ln(x) = x$$

$$\ln_e\left(\frac{y-1}{2x}\right) = x$$

$$e^x = \frac{y-1}{2x} \rightarrow 2xe^x = y-1$$

$y = 2xe^x + 1$